

## Geometric Optics Lab

1. Go to <http://www.colorado.edu/physics/phet>, where you will find the *Geometric Optics* activity under “Light & Radiation.” Take the pencil and raise it so that the eraser is sitting on the principal axis. Click on the “principal rays” button.
  - 1.1 Draw the ray diagram. Describe the three special principal rays: how do they enter the lens, and how do they exit the lens?
  - 1.2 There are several properties of the lens you can change in this simulation. For each one below, **PREDICT** what you think the effect will be on the image (its size, location, and brightness), then give the actual answer:
    - a) Radius of curvature of the lens
    - b) Refractive index
    - c) Diameter
  - 1.3 You can change the location of your object (the pencil). Drag the pencil so that it is *farther away* from the lens. Explain the result.
  - 1.4 Drag the pencil so the eraser is right on top of the focus. Draw the ray diagram.
    - A) What happens to the two principal rays that enter the lens?
    - B) Will they ever form an image?
2. Get a magnifying lens and use it to look at this paper.

2.1 How do you use the lens to make the words appear larger?

Find the spot where the magnification is highest and explain in terms of the focal length of the lens.

2.2 Sketch a ray diagram of how you *think* the magnifying lens might work.

2.3 Now back to the simulation: drag the pencil so it is inside the focus. Draw the ray diagram.

A) Will the rays ever form an image, and if so, where? Click on “virtual image” to check your answer.

B) Imagine that you are looking through the lens from the right hand side. What would you see?

Use your answer, and your drawing, to explain how a magnifying lens works.